

REMARKS

Claims 1-7 are all of the claims pending in the application. By this Amendment, Applicant hereby amends claims 1 and 5, without narrowing, for purposes of conformity with U.S. practice, and adds claims 8-10.

I. Formal Matters

Applicant thanks the Examiner for initialing and returning the form PTO/SB/08 submitted with the Information Disclosure Statement of December 18, 2007, indicating that the documents cited therein have been considered.

II. Summary of the Office Action

The Examiner acknowledged that Applicant overcame the prior art reference, U.S. Patent No. 7,224,510 to Kitano, et al. (hereinafter "Kitano"), by perfecting priority. Accordingly, the Examiner withdrew the 35 U.S.C. § 102(e) rejection with respect to Kitano. However, the Examiner found a new reference and rejected claims 1-7 under 35 U.S.C. § 102(a).

III. Claim Rejections under 35 U.S.C. § 102(a)

Claims 1-7 are rejected under 35 U.S.C. § 102(a) as allegedly being anticipated by Japanese Patent Application Publication No. 2002-196739 to Yoshiro (hereinafter "Yoshiro"). Applicant respectfully traverses this rejection and respectfully requests the Examiner to reconsider this rejection at least in light of the comments which follow.

Only claims 1 and 5 are independent. Turning first to claim 1, Applicant respectfully submits that Yoshiro does not disclose or suggest "a coating area of the electrode provided on two substrates respectively is patternized with respect to a projected area of respective cells," as

recited, *inter alia*, in claim 1.¹ The Examiner points to FIGS. 2 and 5 and paragraphs 0047, 0048, 0054, and 0055 of Yoshiro. But Yoshiro does not disclose or suggest any specific pattern or arrangement of the electrodes or coating area of the electrode with respect to a projected area of respective cells.

The cited paragraphs of Yoshiro merely disclose that “the particle expression medium 15 is the composition that the display lateral electrode 22, the spacer 26, and the back lateral electrode 25 were formed in order between the transparent display substrate 20 and the back substrate 23 which form a picture display surface” (*see* paragraph 0047 of Yoshiro). Yoshiro further discloses that the display substrate 20 comprises a transparent ITO electrode of the light transmittance state, for example, and the back substrate 23 comprises an epoxy group board with an electrode (*see* paragraph 0048 of Yoshiro). A person of ordinary skill in the art would clearly understand that merely disclosing arranging the display lateral electrode, the spacer, and the back lateral electrode in a particular order is not the same as patternizing a coating area of the electrode provided on two substrates respectively with respect to a projected area of respective cells.

Furthermore, FIG. 5 of Yoshiro to which the Examiner points shows the big screen 30 and the small screen 32 of the display 11 (*see* paragraph 0063 of Yoshiro). According to Yoshiro, the number of the unit cells 13 of the big screen 30 and the small screen 32 is made the same, as shown in FIG. 5 (*see* paragraph 0063 of Yoshiro). Therefore, according to Yoshiro, if the display lateral electrode of the unit cell 13 of a position in which the big screen 30 and the small screen 32 correspond mutually is connected by the wiring 38, voltage is impressed to one

¹ Applicant's understanding of Yoshiro is based on a machine translation, a copy of which is attached.

display lateral electrode of a big screen and the small screens 32 and current flows, current is supplied also to another side, an electric field occurs, particles move by this electric field and the color of the unit cell of the same position has composition which changes synchronously (*see* paragraph 0064 of Yoshiro). FIG. 5, however, fails to even depict the electrodes, thus FIG. 5 cannot disclose or suggest that a coating area of the electrode provided on two substrates respectively is patternized with respect to a projected area of respective cells.

Applicant respectfully submits that claim 1 is patentable over Yoshiro for at least the above-discussed reasons. Furthermore, Applicant respectfully submits that claims 2-4 are patentable over Yoshiro at least by virtue of their dependency on claim 1.

Turning now to independent claim 5, Applicant respectfully submits that Yoshiro does not disclose or suggest “in the case of arranging the image display panel vertically in a stationary manner, the electrode is patternized in such a manner that no electrode portion is formed at a vertically lower portion in respective cells,” as recited, *inter alia*, in claim 5. The Examiner again points to FIGS. 2 and 5 and paragraphs 0047, 0048, 0054, and 0055 of Yoshiro. As argued above, Yoshiro does not disclose or suggest any specific pattern or arrangement of the electrodes or coating area of the electrode, much less that no electrode portion is formed at a vertically lower portion in respective cells.

Additionally, the Examiner alleges that “in the case of arranging the image display vertically the electrode ‘20’ will be in the vertical position and the electrode ‘20’ is pattern in such a manner that none of electrode ‘20’ will be in the lower portion of the respective cell” (*see* page 4 of the Office Action dated January 4, 2008). Element 20, however, is the display substrate, not an electrode (*see* paragraph 0049 of Yoshiro). Instead, as shown most clearly in FIG. 3 of Yoshiro, the display lateral electrodes 22 and back lateral electrodes 25 extend all the

way to the edge of the cells to the spacers 26. Accordingly, Yoshiro fails to disclose or suggest that in the case of arranging the image display panel vertically in a stationary manner, the electrode is patternized in such a manner that no electrode portion is formed at a vertically lower portion in respective cells, showing instead that the electrodes extend to the edge portions of the cells.

Consequently, Applicant respectfully submits that claim 5 is patentable over Yoshiro for at least the above-discussed reasons. Furthermore, Applicant respectfully submits that claims 6 and 7 are patentable over Yoshiro at least by virtue of their dependency on claim 5.

With respect to dependent claims 2, 3, 4, 6, and 7, the Examiner alleges that some combination of FIGS. 2, 3, 7, and 9 and paragraphs 0047, 0048, 0054, and 0055 disclose each of the features recited in the claims.

For example, the Examiner alleges that Yoshiro discloses “wherein at least one of the electrodes provided on the two substrates respectively has a coating area in respective cells of 5 - 99 % with respect to a projected area of respective cells,” as recited, *inter alia*, in claim 2, “wherein at least one of the electrodes provided on the two substrates respectively has a coating area in respective cells of 30 - 90 % with respect to a projected area of respective cells,” as recited, *inter alia*, in claim 3, and “wherein a contact dimension between at least one of the electrodes provided on the two substrates respectively and the partition wall is less than 50 % of an inner peripheral dimension of respective cells,” as recited, *inter alia*, in claim 4. Applicant respectfully disagrees.

Additionally, the Examiner alleges that Yoshiro discloses “wherein an area of the no electrode portion formed at a vertically lower portion in respective cells is 5 - 50 % with respect to a projected area of respective cells,” as recited, *inter alia*, in claim 6, and “wherein an area of

the no electrode portion formed at a vertically lower portion in respective cells is 15 - 45 % with respect to a projected area of respective cells,” as recited, *inter alia*, in claim 7. Applicant respectfully disagrees.

Yoshiro fails to disclose either in the portions cited by the Examiner or elsewhere these specific ranges or any ranges. Accordingly, Yoshiro fails to anticipate claims 2, 3, 4, 6, and 7, and the claims are patentable over Yoshiro, at least for this reason, in addition to the reasons discussed above.

IV. New Claims

Applicant hereby adds claims 8-10, which are supported throughout the specification. Applicant respectfully submits that claims 8-10 are patentable over Yoshiro at least by virtue of their dependency on claim 1.

Applicant further submits that claim 8 is patentable over Yoshiro at least because Yoshiro does not disclose “the coating area of the electrode provided on two substrates respectively is patternized in such a manner as to prevent uneven distribution of the particles to a portion of the partition walls formed around the plurality of cells after application of the electrostatic field produced by the electrodes to the particles,” as recited, *inter alia*, in claim 8.

Applicant further submits that claim 9 is patentable over Yoshiro at least because Yoshiro does not disclose “the coating area of the electrode provided on two substrates respectively is patternized in such a manner as to prevent production of agglutination members at a portion of the partition walls formed around the plurality of cells after application of the electrostatic field produced by the electrodes to the particles,” as recited, *inter alia*, in claim 9.

Applicant further submits that claim 10 is patentable over Yoshiro at least because Yoshiro does not disclose “the coating area of the electrode provided on two substrates

respectively is patternized in such a manner as to prevent particle drop at center portions of the plurality of cells after application of the electrostatic field produced by the electrodes to the particles,” as recited, *inter alia*, in claim 10.

With respect to claims 8-10, Applicant respectfully submits that Yoshiro is silent regarding any patternization with respect to a projected area of respective cells.

V. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly invited to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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WASHINGTON OFFICE

23373

CUSTOMER NUMBER

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Registration No. 60,150

Date: April 16, 2008

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q88775

Taichi KOBAYASHI, et al.

Appln. No.: 10/540,563

Group Art Unit: 2873

Confirmation No.: 6718

Examiner: James JONES

Filed: December 7, 2005

For: IMAGE DISPLAY

PETITION FOR EXTENSION OF TIME UNDER 37 C.F.R. § 1.136

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. § 1.136, Applicant hereby petitions for an extension of time of one month, extending the time for responding to the Office Action of January 4, 2008 to May 4, 2008.

The statutory fee of \$120.00 is being charged to Deposit Account No. 19-4880 via EFS Payment Screen. The USPTO is also directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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*** NOTICES ***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to picture display system starting and the picture display system especially used at a meeting etc.

[0002]

[Description of the Prior Art]It is common to take the gestalt which a presenter explains to many participants at a meeting or a reception conventionally using the picture displayed on the big screen. In this case, in order that many participants can recognize the contents, seeing the same display image, a big screen display is needed. Therefore, directing the part which a presenter explains using pointers, such as a rod and a laser beam, using a projector etc. generally is made. When it is necessary to explain, performing the input which included figure drawing in the screen directly, it is common to use a blackboard, a white board, etc.

[0003]It is necessary to keep the contents of the meeting as documents by saving the inputted picture, electronizing and supplying a participant widely in such a meeting and a reception. Therefore, carry out coordinates recognition of the picture of the pen input written in the white board of the big screen etc. which are used for offices, such as a meeting, by Dej Tara Ihza etc., change into digital data, or scan a picture, and data is incorporated, Saving as digital data, transmitting the saved data to output units, such as a printer, and performing the output to a paper is made.

[0004]

[Problem(s) to be Solved by the Invention]However, there are the following problems in the method of the conventional image input and an output. First, since it inputs into the expression medium of a big screen freehand directly when inputting the whole frame and creation of a table, it may be unable to become the bent line or may be unable to read in the case of a picture image pick-up of scanning of a line art image. On the contrary, although the way which carries out a direct entry to the board of a big screen is excellent in inputting a detailed figure, when calling at the projection which carried out the projection view of the small screen, and expanded it by the projector etc., the input by the side of a small screen becomes difficult.

[0005]A figure, a character, etc. are crushed also in the case where were hard for a participant to recognize a figure, a character, etc. which were displayed on the big screen in detail, or it prints on the small paper about A4 or B5 by using as digital data the contents written in the big screen etc., and there is a case of being unable to perform the check of the contents.

[0006]In the conventional picture display system, the contents written in the white board etc. are changed into digital data, and are once stored in a host computer etc., by outputting this digital data to printers, such as a printer, a picture is kept and record is checked. Therefore, the software for changing into digital data and the software for printing are not only needed, but it must distribute the printed matter printed with the printer to all participants, and print work and distribution work are needed.

[0007]In such a case, it is difficult for a participant to obtain the printed printed matter simultaneously, and since printed matter will be taken in order one by one, acquisition of printed matter takes each participant time. Therefore, to advance of a meeting etc., delay may be produced in next action and work, or lack of the determination matter in an aggregate [/ which is called lack etc. of memory under the situation record and

distribution at the time of the recorded distribution] may arise.

[0008]Although the projector by the main exposure is mainly used especially at the big hall, when a participant takes a memo etc., since it is dark in the hall, a note is difficult. In such a scene, although a reflection type expression medium is desired, there is a difficulty referred to as being hard to see the reflection type display medium using a liquid crystal etc. for example, since display contrast is low. There is also a difficulty said that enlargement is difficult by the stability of an expression medium and both sides of cost.

[0009]From the above thing, this invention can draw a figure, the frame of a table, etc. easily to a big screen, and an object of this invention also gives a detailed indication to provide the picture display system which can be recognized good.

[0010]

[Means for Solving the Problem]To achieve the above objects, a picture display system of the invention according to claim 1, A main display medium provided with a big screen which displays either of the part images in which a partial area of a whole image and this whole image is shown, and a small screen, It has an input means which inputs a new image into said big screen and at least one screen in said small screen, and a display control means which controls a displaying condition of said big screen and said small screen so that a new image inputted by said input means is reflected in other screens.

[0011]In a picture display system of this invention, a main display medium is provided with a big screen and a small screen, and displays either of the part images in which a partial area of a whole image and this whole image is shown respectively. The input means can input a new image to a big screen of a main display medium, and two screens of a small screen, and a display control means is controlling a new image inputted into further one screen to be displayed also on a screen of another side.

[0012]Namely, in this invention, display a whole image on a small screen of a main display medium, and display a part image on a big screen, or. On the contrary, display a whole image on a big screen, and display a part image on a small screen, a whole image is displayed on both a big screen and a small screen, or a part image can be displayed on both a big screen and a small screen.

[0013]For example, by not carrying out a direct entry to a big screen, if it inputs into a whole image displayed on a small screen when inputting the whole frame and a line of a table freehand, since the whole frame and a line of a table are reflected in a big screen, **, A problem of it being unable to become the bent line compared with a case where a direct entry is carried out to a big screen, or an input means not reaching a desired position and being unable to input into it can be prevented from arising.

[0014]Since a picture which it is not only easy to input, but [since a direct entry can be carried out to a big screen,] reflected an inputted new image is displayed also on a small screen also when inputting a detailed picture, a picture displayed on a small screen is crushed and it can avoid becoming recognition impossible or carrying out erroneous recognition etc.

[0015]When a new image inputted into a big screen when a whole image was displayed and a part image was being displayed on a big screen in a small screen is inputted into a position included in a viewing area of a small screen, are reflected in a small screen, but. When a new image is inputted into a position which is not included in a viewing area of a small screen, it is not displayed on a small screen. However, if an image display region of a small screen is changed so that a part image displayed on a small screen may display a field containing a new image, it will be displayed also on a small screen.

[0016]The main display medium of this invention should just be an expression medium with two screens of a big screen and a small screen, and these two screens may be provided on the same side, and may constitute a small screen so that desorption is possible. Since it can input into a small screen, seeing a big screen and checking an overview by displaying a whole image on a big screen when a small screen is constituted so that desorption is possible, it is user-friendly. Again. It is also possible to overlook a big screen and to input a new image into a small screen by an input means, carrying a small screen.

[0017]In the picture display system according to claim 1 by the invention according to claim 2, Have further at least one subexpression medium provided with a screen which displays a picture which synchronized with either of the pictures displayed on a picture displayed on said big screen, and said small screen, and said input means, It is constituted by screen of said subexpression medium so that an input of a new image is possible, and said display

control means controls a displaying condition of a screen of a subexpression medium to display a new image inputted into screens other than a screen of said subexpression medium on a screen of said subexpression medium.

[0018]A main display medium provided with a big screen which one side displays a whole image and displays a part image which another side shows a partial area of this whole image in this invention, and a small screen, At least one subexpression medium provided with a screen which displays a picture which synchronized with either of the pictures displayed on a picture displayed on said big screen, and said small screen, So that a new image inputted by input means which inputs a new image into said big screen, said small screen, and at least one screen in a screen of said subexpression medium, and said input means may be reflected in other screens, It has a display control means which controls a displaying condition of said big screen, said small screen, and a screen of said subexpression medium.

[0019]Since a new image inputted into a screen of a subexpression medium by having such composition is also reflected in a big screen and a small screen, an input by remote control is easy and preferred.

[0020]A screen of a subexpression medium shows a big screen of a main display medium, one picture of the small screens, and a picture that synchronized, and an input means, A display control means is controlling a new image which could input a new image to all three screens, a big screen of a main display medium, a small screen, and a screen of a subexpression medium, and was inputted into either of three more screens to be displayed on all the three screens.

[0021]An input means may be provided in each of three screens, a big screen, a small screen, and a screen of a subexpression medium, and may be provided in any one of these three screens. A new image can be inputted into a subexpression medium installed in a place which is different from a main display medium by one input means by one input means, without a user rehaving an input means in all these three screens, when an input of a new image is possible.

[0022]Like a picture display system indicated to claim 3, said main display medium can be considered as composition so that it may have a switching means which switches each of a picture displayed on a big screen, and a picture displayed on a small screen to either a whole image and a part image. After switching display information to a part image by a switching means by this after displaying a whole image on a big screen, or displaying a part image on a big screen conversely, display information can be switched to a whole image by a switching means.

[0023]For example, when inputting a straight line covering the whole picture as a new image, by making a small screen into whole mode and inputting it, a straight line bends during an input and problems, such as becoming hard to see, can be avoided. In a case where a figure and a character of a whole image fine to a part are inputted, it becomes easy to input, a figure and a character are crushed by changing by a switching means so that a part image may be displayed on a small screen, and problems, like it is hard to see can be avoided. For example, as shown in the whole frame or a table, by a case where a figure covering the whole is inputted. By changing by a switching means so that a whole image may be displayed on a small screen, user-friendliness is good, also when writing a straight line freehand, it can stop that a line bends as much as possible, and it can be written finely.

[0024]As indicated to claim 4, it has an area selection means to choose a part of picture displayed on said big screen as an imaging range displayed on said small screen, and it can constitute so that a part image displayed on a small screen may be chosen by an area selection means. An area selection means may be constituted so that a partial area of the whole images may be chosen by a frame fixed beforehand, and it can be constituted so that it may choose by a **** frame with the variable selected area of selection of a desired partial imaging range. Under the present circumstances, it may constitute so that it may display on the 2nd screen without changing size and resolution of the original picture and a picture, but it may constitute so that size and resolution of a picture may be changed and displayed according to size of the 2nd screen, or it may constitute so that it may adjust and display on magnification and resolution for which a user asks.

[0025]As indicated to claim 5, said subexpression medium can be constituted so that it may have a picture selection means which chooses one picture of the pictures displayed on a picture displayed on said big screen, or said small screen, and is displayed on a screen of said subexpression medium.

[0026]A picture selection means which chooses either picture of a picture displayed on a big screen and a picture

displayed on a small screen is established, and it constitutes so that a display control means may display a picture with a selected picture selection means on a screen of a subexpression medium. Thereby, a check of a whole image and a check of detailed images can be performed on the same screen.

[0027] Said subexpression medium can also be considered as composition provided with two screens of a screen for big screens which displays a picture displayed on said big screen, and a screen for small screens which displays a picture displayed on said small screen instead of establishing a picture selection means.

[0028] It may be made to arrange at least one subexpression medium in the same room as a main display medium mentioned above, and may be made to arrange it in a different room. As indicated to claim 6, said main display means and said subdisplaying means can also be constituted so that it may be connected via a communication line by a cable or radio. In this case, it becomes possible to hold a meeting, delivering data in real time among participants who are present in a remote place, since a main display medium and a subexpression medium can be arranged in a different room.

[0029] It is desirable when said said big screen, said small screen, and at least one screen in a screen of said subexpression medium consider it as an expression medium which has display-memory nature, as indicated to claim 7. An expression medium which has display-memory nature is an expression medium with which a displaying condition is maintained even if it intercepts a driving source. For example, Twistig Ball Display (2 color-coat division particle rotational display medium), an electrophoresis type expression medium, a magnetic migration type expression medium, a thermal rewritable expression medium, a liquid crystal that has memory nature, an expression medium using a toner (particles), etc. are applicable.

[0030] Black is made to carry out [one side] inversion driving of the ** part beam spherical particle for the remaining opposite side to white by operation of an electric field, for example, Twistig Ball Display displays by making an electric field act so that a picture part may make a black surface the display surface side and may make a white side the display surface side in a nonimage area. According to this, as long as there is no operation of an electric field, particles have the memory nature of a display in order not to cause inversion driving. Although oil exists only in a cavity of the circumference of a particle, since most insides of an expression medium are solid states, sheet-izing of an expression medium, etc. are comparatively easy for them.

[0031] By electric field or a magnetic field, an expression medium using electrophoresis and magnetic migration distributes a movable coloring particle in a white fluid, and forms a picture by color of a coloring particle, and a color of a white fluid. For example, a picture part makes a coloring particle adhere to a display surface, and displays a color of a coloring particle, in a nonimage area, a coloring particle is removed from a display surface and white with a white fluid is displayed. In an expression medium using electrophoresis and magnetic migration, since movement of a coloring particle will not take place if there is no operation of an electric field or a magnetic field, it has the memory nature of a display.

[0032] A thermal rewritable expression medium changes cooking temperature of a heat-reversible recording material, it is an expression medium which repeats record and elimination of a character by changing transmissivity of light, and performs them, and unless cooking temperature is changed, since a displaying condition does not change, it has the memory nature of a display. There is a ferroelectric liquid crystal which used a liquid crystal element called a ferroelectric liquid crystal molecule as a liquid crystal which has memory nature, for example.

[0033] Some expression media using a toner (particles) are proposed (Japan Hardcopy, '99 collected papers, p249-p252, Japan Hardcopy, a collection of '99 fall drafts, p10-p13).

[0034] These expression media between a transparent display substrate, and this and a back substrate which counters with minute clearance, It has composition which enclosed a particle group (toner) which is two kinds from which a color and an electrifying characteristic differ, and by impressing an electric field according to picture information among these substrates, particles of arbitrary colors are made to adhere to a display substrate, and image display is performed.

[0035] Even if especially a subexpression medium intercepts a driving source, when an expression medium which has the memory nature by which a displaying condition is maintained is used, it is preferred. Thus, when said said big screen, said small screen, and at least one screen in a screen of said subexpression medium consider it as an expression medium which has display-memory nature, a picture can be held only by intercepting a driving source of an expression medium. It is preferably considered as a sheet shaped dismountable recording medium, and a

picture can be held and distributed, without printing with a printer by changing a recording medium for a new thing, whenever it saves a picture with the necessity for preservation. After receiving a picture signal from a main display medium and making it display on a subexpression medium, it is also possible to constitute so that only a subexpression medium may be carried. By having such composition, efficiency, such as transfer of information and arrangement of information, can be raised.

[0036]It is good also as a different kind from a main display medium and a subexpression medium, and the same kind of expression medium may be used. When forming two or more subexpression media, the same kind of expression medium may constitute all the subexpression media, or they may consist of expression media of a different kind. An impression of a display image can avoid problems, like transfer of information becomes insufficient instead by considering it as the same kind of expression medium preferably.

[0037]Preferably, as indicated to claim 8, an expression medium which has said display-memory nature has the transparent display side at least, And an electric field generating means which generates an electric field between a substrate of a couple arranged face to face, and a substrate of said couple, It is good to consider it as at least two kinds of particle groups which differ in a color and an electrifying characteristic which move to a substrate by the side of said display according to an electric field which was enclosed between substrates of the Norikazu Saki pair, and was generated between substrates of said couple, and a particle expression medium ** constituted.

[0038]This particle expression medium by an electric field produced among one pair of substrates by an electric field generating means. At least one of at least two kinds of particle groups enclosed between substrates is moved to the transparent display side board, It is the composition which displays a picture by a color of particles which moved to this display side board, and since particles do not move until an electric field is impressed, there is an advantage of not needing driving sources, such as a power supply, for a display.

[0039]Since big screen-ization can draw both a big screen and the screen of high resolution easily with a reflection type expression medium in which a high definition is also possible, it can not only be legible, but it can build a system which performs a required input correctly quickly.

[0040]As indicated to claim 9, preferably said input means, It is good to constitute so that it may have an electric field generating means which produces an electric field between substrates of a field which approached or contacted this writing member by approaching or contacting a substrate of either of the substrates of said couple in pen-shaped a writing member and this writing member.

[0041]Since it is easy to concentrate an electric field on a pen point part by making an input means into pen shape, there is an advantage referred to as it being possible to impress a strong electric field locally, and excelling in an input of a fine picture. Since it is pen shape, a detailed picture can be drawn by the same operation as a handwritten input to a paper, and there is also an advantage of being easy to use a user. May constitute an electric field generating means so that an electric field may be produced between substrates of a field which made an electric field form in a pen point part, and approached or contacted it with a nib beforehand, and, It is good also as composition through which provides a pressure-sensitive conductive liner sheet in the surface by the side of a display surface of a display substrate beforehand, serves as the pressure-sensitive conductive liner sheet drawing conductivity of a portion pressed when it was pressed by pen point part, where voltage is impressed to a substrate of said couple, and current flows into this portion and which an electric field generates.

[0042]As indicated to claim 10, said said big screen, said small screen, and a screen of said subexpression medium have to electrically connect with wiring a good picture element position which comprises a particle expression medium with which an electrode was formed for every pixel, respectively, and corresponds, respectively.

[0043]Since current will flow through that field by this if an electric field is impressed to a picture element electrode by an input means, this current is supplied to a picture element electrode of a position in which other expression media correspond via wiring, and an electric field occurs, and corresponding particles of a position move to the display substrate side, and form a picture. Thus, according to the invention according to claim 10, it is possible to display a picture which synchronized with easy composition.

[0044]Of course, it is also possible to have composition which a display control means controls to make a picture element electrode of a position which detects a field by which an electric field was impressed to a picture element electrode by an input means, and through which current flowed, and in which other expression media correspond produce an electric field.

[0045]

[Embodiment of the Invention](A 1st embodiment) An embodiment of the invention is described, referring to a figure. Drawing 1 is a figure showing the image system outline of this invention. This picture display system 10 equips both the display 11 and the big screen 30 which have two screens, the big screen 30 and the small screen 32, and the small screen 32 with the pen member 34 and the control section 36 in which an image input is possible. The display 11 is equivalent to the main display of this invention, this invention carries out the input means equivalent of the pen member 34, and a control section is equivalent to the display control means of this invention.

[0046]The two screens 30 and 32 of the display 11 are constituted by the expression medium 15 (the particle expression medium 15 is called hereafter.) which used the toner (particles), respectively, and, as for the pen member 34, negative direct current voltage is impressed to the pen point part by the control section 36. Big screen-ization is an expression medium with the memory nature which displays a high definition picture easily, and the particle expression medium 15 is a suitable expression medium for this invention.

[0047]Here, the composition of the expression medium 15 using a toner (particles) is explained. As shown in drawing 2 (A), the particle expression medium 15 is the composition that the display lateral electrode 22, the spacer 26, and the back lateral electrode 25 were formed in order between the transparent display substrate 20 and the back substrate 23 which form a picture display surface. Although a graphic display is not carried out, the respectively transparent surface coat layer is formed in the surface of the display lateral electrode 22 and the back lateral electrode 25.

[0048]At a 1st embodiment, the display substrate 20 comprises a transparent ITO electrode of the light transmittance state, for example. As the back substrate 23, it comprises an epoxy group board with an electrode. The interval of the display substrate 20 and the back substrate 23 is about 200 micrometers, for example. Of course, this invention is not limited to these values. If a pressure is applied, the pressure-sensitive conductive liner sheet 21 which has the character which becomes conductivity is formed in the surface by the side of the display of the display substrate 20.

[0049]Between the display substrate 20 and the back substrate 23, as shown in drawing 2 (B), the spacer 26 formed in the shape of a lattice is formed. The spacer 26 is the septum about 0.3 mm high formed in the shape of a lattice with insulating materials, such as acrylic ultraviolet curing resin, and has demarcated the unit cell, for example. In each unit cell, the particles of two colors which can take contrast in a mutual color are enclosed. Here, the coloring particle (black particles) 40 and the white particles 42 are enclosed.

[0050]As the white particles 42 enclosed in a unit cell, Here the impalpable powder of the titania which carried out isopropyl-trimethoxy-silane processing, The spherical white particles (Sekisui Plastics Co., Ltd. make theque polymer MBX-20-white) of titanium oxide content bridge construction polymethylmethacrylate with a mixed at a rate of the weight ratio 100 to 0.1 volume average particle diameter of 20 micrometers are used, As the black particles 40, Aerosil A130 impalpable powder which carried out aminopropyl trimethoxysilane processing, The spherical black particles (Sekisui Plastics Co., Ltd. make theque polymer MBX-20-black) of carbon content cross-linked-poly methyl METAKU relay ** with a mixed at a rate of the weight ratio 100 to 0.2 volume average particle diameter of 20 micrometers are used.

[0051]As the white particle 42, for example The granular particles of titanium oxide content bridge construction polymethacrylate (MBX-white (trade name); made by Sekisui Plastics Co., Ltd.), The spherical particles of bridge construction polymethylmethacrylate (Kem Snow MX (trade name); made by Soken Chemical & Engineering, Inc.), the particles (Leblond L(trade name); Daikin Industries, LTD. make.) of polytetrafluoroethylene The product made from SST-2(trade name);Shamrok technologies Inc., The particles of carbon fluoride (toss pearl (trade name); made by Toshiba Silicone, Inc.), The particles of titanium oxide content polyester (the BIRYUSHIA PL1000 white T (trade name); made by Nippon Paint Co., Ltd.), The particles (KONAKKU No.1800 white (trade name); made by Nippon Oil & Fats Co., Ltd.) of a titanium oxide content polyester acrylic, the spherical particles (hype silica (trade name); made by Ube-Nitto Kasei, Inc.) of silica, etc. can be used.

[0052]moreover -- as the black particles 40 -- the time -- vinylbenzene -- the main ingredients -- carrying out -- bridge construction -- a copolymer -- from -- becoming -- a real ball -- ** -- a particle (micro pearl BB.) Micro pearl BBP (trade name); The Sekisui Plastics Co., Ltd. make, the spherical particles of bridge construction

polymethylmethacrylate (MBX-black (trade name); made by Sekisui Plastics Co., Ltd.), The particles of amorphous carbon which calcinated phenol resin particles as conductive black particles (uni-BEKKUSU GCP (trade name); made by Unitika, Ltd.), The spherical particles (NIKABIZU ICB, NIKABIZU MC, NIKABIZU PC (trade name); made by Nippon Carbon Co., Ltd.) of carbon and graphite, etc. can be used.

[0053]According to a 1st embodiment, in the unit cell 13, about 10% of quantity is enclosed for the mixed granule child who mixed the white particles 42 mentioned above and the black particles 40 at a rate of the weight ratio 2 to 1 to the volume of the unit cell 13. In this embodiment, the white particles 42 are charged in negative and the black particles 40 are just charged.

[0054]After the particle expression medium 15 eliminates uniformly the mixed granule child of about 10% of quantity in the unit cell 13 through a screen here to the volume of the unit cell 13, The surface coat layer side should be made into the unit-cell 13 side, the display substrate 20 in which the surface coat layer and the display lateral electrode 22 were formed shall have been arranged, application-of-pressure maintenance of both the boards should be carried out with the double clip, and it should be formed by sticking a silicon rubber sheet and both boards.

[0055]The display lateral electrode 22 is formed in the display substrate 20 side of each unit cell 13, and the back lateral electrode 25 is formed in the back substrate 23 side. The display lateral electrode 22 and the back lateral electrode 25 comprise an ITO electrode, respectively, the display lateral electrode 22 is grounded, respectively, and the back lateral electrode 25 is connected to the control section 36.

[0056]The control section 36 is constituted including the power supply 39 and the changeover switch 37, it controls the power supply 39 and the changeover switch 37, and controls the displaying condition of the particle expression medium 15, and it is also controlling the voltage impressed to the pen member 34. A personal computer etc. and connection are possible for the control section 36, and based on the image data inputted from the personal computer, it controls the power supply 39 and the changeover switch 37, and displays a picture.

[0057]For example, by impressing voltage to the display lateral electrode 22 of a position according to picture information among the display lateral electrodes 22 which controlled the changeover switch 37 and were provided for every unit cell, as shown in drawing 3, It moves according to the electric field which made the unit cell of the position which impressed voltage generate an electric field, and the particles in the unit cell 13 generated, and a picture is displayed. The control section 36 is connected also with the pen member 34.

[0058]At the time of the input of a picture, voltage is impressed to each of the display lateral electrode 22 provided every unit cell 13. It moves according to the electric field which an electric field is generated every unit cell 13, and the particles in the unit cell 13 generated by this, and a picture is displayed.

[0059]By for example, operation of the electric field generated in the unit cell 13 by the control section 36 when positive direct current voltage was impressed to the display lateral electrode 22 as shown in drawing 4. The white particles 42 charged in negative [by the side of the back substrate 23] move to the display substrate 20 side, and the just charged black particles 40 are attracted electrostatically at the back substrate 23 side.

[0060]For this reason, only the white particles 42 adhere to the display substrate 20 uniformly, and a good white display (for example, reflection density ≤ 0.3) is attained. Under the present circumstances, even if the black particles 40 electrified in reverse polarity are recognizing fine amount existence at the display substrate 20 side, since there is little quantity as compared with the quantity of the white particles 42, most influences on a display image are not seen.

[0061]By next, operation of the electric field generated in the unit cell 13 by the control section 36 when about [-150V--350V] negative direct current voltage was impressed to the display lateral electrode 22, for example. The black particles 40 charged in positive [by the side of the back substrate 23] move to the display substrate 20 side, and the white particles 42 charged in negative are attracted electrostatically at the back substrate 23 side.

[0062]For this reason, only the black particles 40 adhere to the display substrate 20 uniformly, and a good black display (for example, reflection density ≥ 1.6) is attained. Under the present circumstances, even if the white particles 42 electrified in reverse polarity are recognizing fine amount existence at the display substrate 20 side, since there is little quantity as compared with the quantity of the black particles 40, most influences on a display image are not seen.

[0063]The big screen 30 and the small screen 32 of the display 11, It is constituted by the particle expression

medium 15 of such composition, and in a 1st embodiment. The number of the unit cells 13 of the big screen 30 and the small screen 32 is made the same, and as shown in drawing 5, it distinguishes between each screen size which it is made to differ and is the whole so that it may become small about the size of the unit cell 13 of the small screen 32 greatly in the size of the unit cell 13 of the big screen 30.

[0064]If the display lateral electrode of the unit cell 13 of a position in which the big screen 30 and the small screen 32 correspond mutually is connected by the wiring 38, voltage is impressed to one display lateral electrode of the big screen 30 and the small screens 32 and current flows, Current is supplied also to another side, an electric field occurs, particles move by this electric field and the color of the unit cell of the same position has composition which changes synchronously.

[0065]Of course, to be shown in drawing 6 as another composition, the big screen 30 and the small screen 32 may be connected via the control section 36, and it may control to send current through the picture element position of other screens which detect the screen and picture element position through which current flowed by the control section 36, and correspond. In this case, the control section 36 is provided with the following. The screen through which current flowed, and the primary detecting element which detects a picture element position.

The current generating part which generates the current sent through the picture element position of other corresponding screens.

[0066]Here, the case where a picture is inputted by the pen member 34 is explained. Before image writing, as shown in drawing 7 (A), negative direct current voltage is impressed to all the back lateral electrodes 25 by the control section 36, white particles move and adhere to the display substrate 20 side, and it has become a white displaying condition.

[0067]If the display side of the display substrate 20 is pressed by the pen member 34, the pressure-sensitive conductivity transparent sheet 21 of the pressed part will serve as conductivity. By this, as shown in drawing 7 (B), the voltage by the pen member 34 is impressed only to the display lateral electrode 22 of the pressed part, since the field intensity between substrates becomes large, black particles will move to the display substrate 20 side, and the color of black particles will be displayed on a display substrate.

[0068]As another composition, as shown in drawing 8, it is also possible to have composition which does not form the pressure-sensitive conductive liner sheet 21 and which is not. In this case, voltage is always impressed to back plate side 25, and via a switch, the display substrate 20 is constituted so that grounding is possible. uniform [by connecting a switch and grounding the display substrate 20] before image writing -- carrying out electric field generating, and the white particles 42 being made to adhere to the display substrate 20 side, and at the time of image writing. The field to which the pen member 34 approached or contacted by approaching or (refer to drawing 8 (A)) contacting the display substrate 20 side in the pen member 34 by which the switch was turned off and voltage was impressed at the tip (refer to drawing 8 (B)) is made to produce an electric field, A picture is displayed by moving the black particles 40 to the display substrate 20 side, and considering only the portion as a black display.

[0069]The composition which forms the through hole 27 which filled up the inside with conductive materials, such as metal, is applicable instead of forming the pressure-sensitive conductive liner sheet 21 as another composition, as shown in drawing 9. This through hole 27 leads to the display lateral electrode 22, when the pen member 34 and the through hole 27 contact, voltage is impressed to the display lateral electrode 22, the field intensity between substrates becomes large, black particles move to the display substrate 20 side, and the color of black particles is displayed on a display substrate. In this composition, since current flows only into the portion which the pen member 34 contacted also by grounding the pen member 34, an electric field is displayed on the portion which the pen member 34 contacted, particles are moved, and a picture can be formed.

[0070]By constituting the circumference or the display substrate of the through hole 27 by an elastic insulation member, since it can prevent voltage not being impressed to the display lateral electrode 22 of a different position from the exterior, and causing an unnecessary electric shock, it is desirable.

[0071]The picture which synchronized is displayed on such two screens 30 and 32 of the display 11 of composition. For example, as are shown in drawing 1 (A), and a part image is displayed on the big screen 30, and a

whole image is displayed on the small screen 32 or it is shown in drawing 1 (B), It can be set up display [may display a whole image on the big screen 30, may display a part image on the small screen 32, or] the picture (drawing 10 whole image) with same big screen 30 and small screen 32 further, as shown in drawing 10.

[0072]According to a 1st embodiment, the area selection part 17 which chooses the field displayed on the changeover switch 16 which changes a display to the control section 36, and a small screen is formed. Thereby, the screen which a presenter displays according to the purpose can be switched. The field which a presenter displays on a small screen according to the purpose can be chosen. By pressing the determination button which displays the frame area appointed beforehand on a big screen, and does not illustrate it, the area selection part 17 may be constituted so that a field may be chosen, and it can be suitably constituted like choosing the field crowded in two points which chose at least two points with cursor, and were chosen. The changeover switch 16 is equivalent to the switching means of this invention, and the area selection part 17 is equivalent to the area selection means of this invention.

[0073]When a whole image is displayed on the small screen 32, it can not only be easy to carry out the input of the new image covering a frame, whole paint, etc., but it can draw early. When it is easy to carry out the input of a small picture to the big screen 30, a whole image or a part image is displayed on the big screen 30 and a small picture is inputted, it can avoid that the picture reflected in a small screen is crushed and recognizing becomes impossible as much as possible.

[0074](A 2nd embodiment) As shown in drawing 11 and drawing 12, a 2nd embodiment, The display 11 of a 1st embodiment mentioned above is used as the main display 11, Sub display 14₁ provided with the small screen which displays the picture displayed on this main display 11 - 14_n. It has the control device 12 which controls (however, positive integers with arbitrary n), and the picture displayed on sub display 14₁ - 14_n so that the display image of the main display 11 and the sub displays 14a-14c may synchronize. The main display 11 is equivalent to the main display medium of this invention, and sub display 14₁ - 14_n are equivalent to the subexpression medium of this invention. The control section 36 and the display control 12 are equivalent to the display control means of this invention.

[0075]In drawing 11, the whole image is displayed on the big screen 30 of the main display 11, and the enlarged display of the part image which is a partial area of a whole image is carried out to the small screen 32. In drawing 12, the part image which is a partial area of a whole image is displayed on the big screen 30 of the main display 11, and the enlarged display of the whole image is carried out to the small screen 32. Of course, constitute so that it may switch whether the picture which provides an image switching section in the main display 11, and is displayed on the big screen 30 by an image switching section is made into a whole image, or a part image is used, or. It can also constitute so that it may switch whether the picture displayed on the small screen 32 is made into a whole image, or a part image is used. Of course, the picture displayed on a big screen and a small screen may be constituted selectable separately.

[0076]n sub display 14₁ - 14_n. As it constitutes so that the picture displayed on the big screen 30 of the main display 11 and the picture which synchronized may be displayed, or shown in drawing 11 and drawing 12, The picture displayed on the big screen 30 of the MEINDI play 11 in the picture displayed on sub display 14₁ - 14_n. The picture selecting switch 18 which chooses either of the pictures displayed on the small screen 32 can be formed, and it can constitute so that the picture displayed on a screen can be chosen. Since the picture displayed on a screen with a participant's intention according to advance of a meeting can be chosen by this, the degree of comprehension of an announcement can be raised more, and recognition becomes possible, without carrying out erroneous recognition also of the pictures which are hard to recognize in a big screen, such as a detailed picture. This picture selecting switch 18 is equivalent to the picture selection means of this invention.

[0077]Of course, as shown in drawing 13, it is also possible to constitute so that a whole image may always be displayed irrespective of the picture displayed on the big screen 30 of the main display 11 without forming the picture selecting switch 18.

[0078]Although the composition in particular of each sub display 14₁ - 14_n is not limited, it is good preferably for the particle expression medium 15 to constitute. About the particle expression medium 15, since a 1st

embodiment explained, explanation is omitted here. Of course, the expression medium etc. which are displayed with a mobile type and common [every] are applicable. This sub display $14_1 - 14_n$. For example, it is an advance screen in a meeting object etc., and it is good also as what is used in order to perform advance of the proceedings of the presenter, chairman, and recorder who use for a presentation, and the statement of a conference note, and good also as what is used by the hearer who hears a meeting.

[0079]To each of n sub display $14_1 - 14_n$. Pen member $34_1 - 34_n$ are provided, and as shown in drawing 14, it is constituted so that a new image can be inputted into a screen by pen member 34_1 provided in each $- 34_n$. It is transmitted to a main display by a control device, and the image data showing the inputted new image is displayed on Screens 30 and 32 of a main display. Of course, it can be considered as one input member, and it can also constitute so that a new image can be inputted by the same input member as all the screens.

[0080]Each of n sub display $14_1 - 14_n$ is good also as the same kind of an expression medium, and can also be used as a different expression medium of a kind. As the same kind of an expression medium, when the particle expression medium 15 is chosen, as shown in drawing 15, for example, Connect the display lateral electrode of the unit cell 13 of a position in which the big screen 30 of the main display 11 and the small screen 32 correspond mutually with the wiring 38, and. As it connects with the big screen 30 of the main display 11, or the small screen 32 (drawing 15 big screen 30) via the control device 12 and n sub display $14_1 - 14_n$ are indicated to be them to drawing 16. It is good to have composition which controls a switch to send current through the picture element position of each screen of sub display 14_1 which detects the screen and picture element position through which current flowed, and corresponds with the control device $12 - 14_n$.

[0081]If voltage is impressed to one display lateral electrode of the big screen 30 and the small screens 32 and current flows by this, current will be supplied also to another side, and. Current is supplied to the picture element position of each screen of sub display 14_1 which detects the screen and picture element position by which it was outputted to the control device 12, and through which current flowed with the control device 12, and corresponds $- 14_n$.

[0082]Therefore, an electric field occurs in the corresponding picture element position on all the screens, and it has composition where particles move and which changes the color of a unit cell by this electric field.

[0083]When each of n sub display $14_1 - 14_n$ is used as a different expression medium of a kind, for example it uses a CRT liquid crystal display etc., In order to have a display driving driver and a controller respectively, it constitutes so that the picture which the control device 12 controlled each display driving driver and controller, and synchronized with each screen may be displayed.

[0084]Are as removable as the control device 12 in at least one of n sub display $14_1 - 14_n$. And since a screen to save the sub display 14 by separating from the control device 12 and a driving source in by constituting from the expression medium 15 which has the memory nature where a display is saved can be held even if it cuts connection with a driving source, there is no necessity of performing a printing job etc. and it is efficient. Preferably, if it separates from the control device 12, it can continue by attaching another sub display, and an inspection and preservation of the next screen can be performed. In this case, as shown in drawing 17, when a paper-like sub display is applied, it is convenient to carry and desirable.

[0085]As shown in drawing 18, control device 12_1 is connected to other control device 12_2 which is in a remote place using a communication line, such as a personal computer and a server, It is also possible to display the picture which synchronized with the screen of the main display 11 on sub display 14_x (however, $x \geq 1$ and arbitrary positive integers) provided in the remote place. Since a new image is inputted into sub display 14_x which exists to the presenter who is in a remote place in this case by pen member 34_x and the display of the screen of a main display can be changed, It is also possible to announce, while the presenter who is in a remote place displays a picture on the main display 11.

[0086]Although the above embodiment and 2nd embodiment that were described explained the case where the

particle expression medium 15 constituted a screen, [1st] Not only this composition but what is necessary is just an expression medium in which a big screen display is possible and the postscript by an input device is possible, and the picture display system of this invention can apply CRT, a magnetic migration display, an electric field migration display, and displays, such as a liquid crystal display.

[0087]Although the case where a pen member was used as an input device was explained, Not only this composition but the picture display system of this invention can apply Dej Tara Ihza using a piezoelectric element like a touch panel, Dej Tara Ihza who changes into XY coordinates the position with which the ON signal was taken out, and outputs it, etc.

[0088]Although the 1st embodiment and 2nd embodiment explained the particle expression medium 15 which displays a picture with the combination of a dot with the active-matrix structure which carries out two-dimensional arrangement of the picture element electrode, A line form electrode is applicable also to the particle expression medium of the simple matrix structure arranged so that it may be intersecting perpendicularly.

[0089]A touch panel, CRT, TwistigBall Display (2 color-coat division particle rotational display medium), an electrophoresis type expression medium, a magnetic migration type expression medium, a thermal rewritable expression medium, the liquid crystal that has memory nature, etc. are also applicable instead of the particle expression medium 15. In this case, according to each expression medium, the input member of composition which can input a new image is used. Thus, since one picture is displayed on each of the big screen 30 and the small screen 32 according to the picture display system 10 of a 1st embodiment and a 2nd embodiment, it is effective in the ability to draw easily. Since it is possible to save time and effort, such as preservation of a picture and printing distribution, by using an expression medium with memory nature, the contents displayed on the screen can be distributed efficiently and it is effective in quick and exact signal transduction being realizable.

[0090]When a particle expression medium constitutes a screen, it is effective in being that of real appearance **** about a big screen and a high contrast display in a reflection type, and the display in the bright interior of a room being possible, and the work of the participant in a meeting object becoming easy.

[0091]

[Effect of the Invention]As explained above, according to this invention, a figure, the frame of a table, etc. can be easily drawn to a big screen, and it is effective in it being possible to also recognize a detailed display good.

[Translation done.]